Flip-Flopping: Ideological Adjustment Costs in the United States Senate

DeBacker, Jason

The University of Texas at Austin

24 April 2008

Flip-Flopping: Ideological Adjustment Costs in the United States Senate

Jason DeBacker

April 24, 2008

Abstract

Models of electoral competition in which candidates can change position at no cost predict the convergence of platforms in a two-candidate election. Such convergence is at odds with empirical observation. In this paper, I undertake a study of candidate positioning in the United States Senate and determine the extent to which electoral costs associated with changing position explain the ideological positions taken by Senators. Using over 50 years of roll call voting data, I use a simulated method of moments approach to estimate a dynamic model of candidate positioning for U.S. Senators. The findings support a model in which Senators face convex costs to changing position, with the best fitting model being one with linear costs of adjustment. The model thus predicts severe punishments for "flip-flopping" Senators (those who make large changes in position). As a result of the significant costs associated with adjusting position, the empirical validity of the Median Voter Theorem (which depends upon candidates being able to change position at no cost) is called into question.

1 Introduction

Models of electoral competition often follow Downs (1957) and allow candidates to freely adjust their positions in the issue space to capture the majority of voters. The result, in a two-candidate election with a single dimensional policy space and single peaked preferences, is both candidates adopting the position of the median voter. Such convergence is rarely observed and is potentially at odds with the party polarization cited by the media and academics (e.g. Poole and Rosenthal (1991)). A possible source of the non-convergence of positions is candidate reputation (see, for example, Bernhardt and Ingberman (1985), Enelow and Munger (1993), and Kartik and McAfee (2007)). That is, candidates may find it costly to change positions in the issue space because it affects the voters perceptions of the candidates credibility or character. Indeed, recent presidential hopefuls John Kerry and Mitt Romney can attest to the electoral costs of changing positions to attract voters.

The following study analyzes the nature of the electoral costs Senators face when adjusting their ideological position. Using over 50 years of roll call voting scores from the United States Senate, I estimate the structural parameters of a dynamic model of candidate positioning. Using a simulated method of moments (SMM) methodology, I am able to identify the nature of ideological adjustment costs in the U.S. Senate.

Understanding the electoral cost associated with a candidates change in position is important for a number of reasons. First, by finding large costs to adjusting position, one calls into question the empirical validity of the median voter model and the policy predictions based upon it. Second, knowing the nature of these costs is important for understanding the role of candidate credibility and reputation in electoral outcomes. For example, if the costs Senators face are non-convex in nature, we would expect to see "flip-flopping" Senators. That is, Senators who hold a position for long periods of time and make relatively large changes in position when they do change. On the other hand, if the costs Senators face are convex in nature, we would expect to see "wishy-washy" Senators. These Senators would change position more often, but with only small moves. Knowing the nature of the costs to changing position is important for predicting electoral equilibria and will shed light on which theoretical models of electoral competition are most appealing on empirical grounds.

The results suggest economically and statistically significant costs of changing position. Further, models that best fit the data are those in which the costs to changing position are convex, with the best fitting model being the linear adjustment costs model. That is, the data show Senators who are not "flip-floppers", but change positions slowly. The standard Downsian model, and the median voter models of political equilibrium are found to be inconsistent with the data on the ideological positioning of U.S. Senators. The theoretical models found to be most consistent with the data are those where the costs to adjusting one's position are linear in nature.

1.1 Previous Literature and Motivation

Models predicting non-convergence of policy platforms in two candidate elections with a single policy dimension come in several flavors. Alesina (1988) presents a model where

politicians care about policy in addition to the rents from office and cannot commit to policy platforms. This creates a principal agent problem between the representatives and the voters. While the candidate would like to promise the median voter's preferred position to win the election, such a promise may not be credible and there for candidate platforms will not converge. A second type of model whose equilibrium may have non-convergence relies upon uncertainty by the voters about the policy to be implemented when the candidate takes office. The policy in office may differ from the announced policy because of preferences by the politician (as in Alesina (1988)), because of future events or because the candidate is unsure about his own preferred position. Enelow and Munger (1993), Bernhardt and Ingberman (1985), Ingberman (1989), and Banks (1990) all describe models of this type and derive the equilibrium conditions of electoral competition. Models of Kartik and McAfee (2007), Callander (2008), and Callander and Wilkie (2007) adopt a combination of the previous two types. Some candidates are policy motivated and others are purely office motivated. However, voters are uncertain about the type of the candidates. Candidates may also have some attribute such as "character" that is valuable to the voters, beyond the policy choice of the candidates. The uncertainty about type of the candidates causes announced positions to become signals of a politicians type, leading to non-convergence of platforms.

Each of these models of non-convergence imply something about the adjustment costs faced by candidates. For example, Enelow and Munger (1993) derive the expected utility of the voters for electing a particular candidate and show the expected utility decreasing in the size of the change in the candidates' policy platforms. Bernhardt and Ingberman (1985) and Ingberman (1989) find similar results. The models of Banks (1990), Callander (2008), and Callander and Wilkie (2007), and Kartik and McAfee (2007) do not include past position as a state variable, but are only focused on positioning in a one-shot election where candidates may face a personal cost to misrepresenting their position. However, in a dynamic framework, signaling of one's motivation is done both through one's current choice of position, and through the dynamics of one's position. Whether the costs to adjusting position in dynamic versions of these models are convex, as in Enelow and Munger (1993), or non-convex (as might result from separating equilibria in a signaling game), depends

upon the form of the personal costs to candidates for misrepresenting their position.

Empirical models of candidate positioning related to the analysis in the following sections include the work of Glazer and Robbins (1993), Ansolabehere, James M. Snyder and Charles Stewart (2001), Levitt (1996), Bronars and John R. Lott (1997), Poole (2003), and Poole and Rosenthal (1997). Glazer and Robbins (1993) find the ideological preferences of voters have a substantial effect on the ideological positions of their Representatives. Using the Conservative Coalition interest group's scores to identify the ideological position of Congressman, they find the voters exert much control over the position of their Congressman and deviations from the voters position are small, even for senior congressman. Ansolabehere et al. (2001) use the National Political Awareness test to identify the positions of both incumbents and challengers in over 100 years of House elections. They find much of a candidates ideology is explained by his party, and in contrast to Glazer and Robbins (1993), find little of a candidates ideological position is determined by local conditions. Levitt (1996) finds Senators place the most weight on their own ideological preferences, with the remainder of their ideological stance being approximately equally determined by the preferences of their constituents and their party. Bronars and John R. Lott (1997) find one's roll call vote choices are not affected by PAC contributions, but that PAC contributions are determined by one's ideological position. Poole (2003) finds little variation in a Congressman's position over his career when using his Nominate scores to define ideological positions. Poole and Rosenthal (1997) find the vast majority of the variation in roll call voting records can be accounted for by a single dimension, the liberal-conservative spectrum. For example, how one votes on school-vouchers correlates very highly with how one voters on tax reform and how one votes on welfare programs. Poole and Rosenthal (1997) have found this single dimension is able to explain the majority of roll call voting patterns, especially after the passage of the Civil Rights Act of 1964. In fact, they find over 90% of roll call vote choice can now be explained by the single dimension, liberal-conservative spectrum. The empirical results and the theoretical models described above motivate my use of such a single dimension in the empirical analysis done here.

None of the empirical work cited presents a dynamic model of candidate positioning. The construction of a quantitative, dynamic model of candidate positioning is one of the

major contributions of this work. However, the model and estimation used here owes much to work in dynamic industrial organization, such as by Cooper and Haltiwanger (2006). Cooper and Haltiwanger (2006) study the nature of costs to manufacturing plants when adjusting their stock of physical capital. The analysis here draws heavily on their methods and characterization of adjustment costs. One can see a similarity between a plant's choice of physical capital for next period based on current and expected productivity shocks and a candidates choice of position, which is based on the current and expected positions of the voters.

The remainder of the paper is organized as follows: Section 2 describes the data used and Section 3 discusses the reduced for evidence for a model in which Senators face costs to changing position. Section 4 outlines the model of candidate positioning in a dynamic environment. Section 5 presents the econometric methodology and discusses identification. Section 6 presents the results and Section 7 concludes.

2 Data

Estimation of the model of candidate positioning requires data on the ideological positions of Senators and their constituents, observations of Senator retirement decisions, and data on election outcomes. The data on Senate retirements and election outcomes is straight forward to collect. These data come from Stewart and Woon (2006), the ICPSR, and the Federal Election Commission and I omit and detailed discussion of these data sources. The data on ideology requires a more thorough description.

Data on the ideological position of Senators and voters come from the Americans for Democratic Action (ADA) interest group ratings of roll call votes. Each year, the ADA select a subset (20 votes) of the year's roll call votes and rate each Congressman on a scale of 0 to 100, where 0 means the Congressman voted against the ADA's position on every roll call vote and 100 means the Congressman voted for the ADA's position on every roll call vote. A score of 0 indicates the the Congressman is very conservative and a score of 100 indicates the Congressman is very liberal, as defined by the ADA. The sample period

is 1947-1999. [1]

Adjustments are made to these scores to allow them to be comparable across time and chambers. These adjustments are described in Groseclose and Steven D. Levitt (1999). Such adjustments to the raw ADA scores are necessary because the issues voted on vary over time and across chambers and so the raw scores are not directly comparable. The adjustments are used to allow the ADA scores to shift and stretch across time and chambers. Thus converting raw scores to adjusted scores is similar to converting temperature from Fahrenheit to Celsius. The adjusted scores are not bounded between 0 and 100. Table 1 presents some summary statistics for the adjusted and nominal ADA scores, separating out the scores for each major party.

Table 1: ADA Scores

Variable	Mean	Std. Dev
Adjusted ADA Score	37.774	29.826
Democrats, Adjusted ADA Score	54.849	25.223
Republicans, Adjusted ADA Score	16.872	20.190
Nominal ADA Score	46.018	31.888
Democrats, Nominal ADA Score	64.655	26.596
Republican, Nominal ADA Score	23.206	21.172

There are several advantages to ADA scores over other measures of ideology, such as the Nominate scores of Keith Poole and Howard Rosenthal. First, ADA scores have a clear definition (i.e. position on the liberal-conservative spectrum, as defined by the ADA). Second, due to the work of Groseclose and Steven D. Levitt (1999), they are comparable over time and across chambers [2]. Third, they are reported at a higher frequency. [3]

The ideological position of each state's voters is proxied for by the mean of the ADA scores of the state's House delegation. This follows the work of Levitt (1996), who uses the same proxy for the preferences of each state's voters. Figure 1 suggests the mean score from the House delegation is a reasonable proxy for the preferences of the voters given the close alignment between the positions of Senators and the voter proxy. [4]

[1] Data from 1947-1959 is constructed by Tim Groseclose based on the ADA's methodology and list of key votes for 1947-1959. The ADA did not publish scores for this time period. Also, scores were not calculated for 1962 and 1964.

[2] D-Nominate scores are comparable over time, but not across chambers. They are also constructed in such a way as to constrain the ideological position of a Congressman to change in a linear fashion.

[3] ADA scores are reported annually, whereas Nominate scores are reported only for each Congress.

[4] I plan to also try the median stance of the House delegation and possibly other aggregates as the proxy

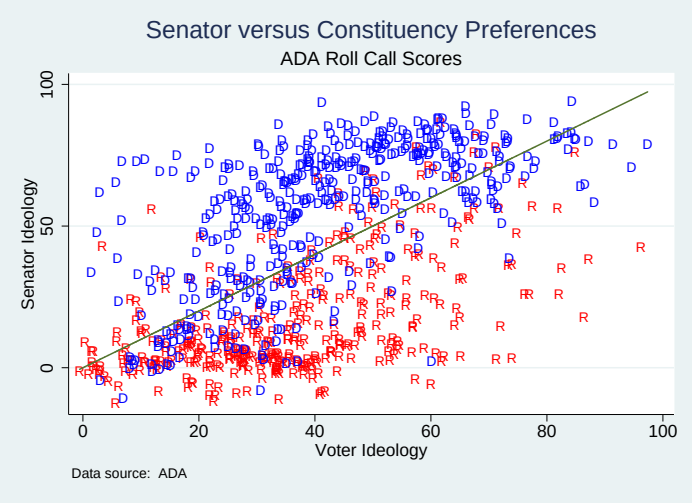

Figure 1: Correlation of Senator and Voter Ideology

Because the ADA scores are based on such a small number of votes, there may be much year to year variation due to the votes the ADA considers each year. To mitigate this noise, I define a period as a term in the Senate and average the scores across the period. I do not calculate scores for Senators who did not receive a score in 2 or more years of the 6 year term, ensuring the ideological position of each Senator is based on at least 80 votes. This leaves me with 809 Senator-term observations over the sample period of 1947-1999. Included in this sample are 357 different Senators. Of these 124 serve only one term, 95 serve two terms, 71 serve three terms, 45 serve 4 terms, and 22 serve five or more terms during the sample period. From the sample, I am able to observe 470 potential changes in position.

Table 2: Summary Statistics

Variable	
Mean years observe Senator	10.466
Mean size of change	0.286
Mean of abs value of change	6.630
Serial Correlation of changes	-0.113
Serial Correlation of Abs Value of Changes	0.260
Correlation of changes in Voter and Senator	0.060
Correlation of voter and Senator ideology	0.544
Fraction of Jumps ($\geq$ 20 point change)	0.019

Summary statistics for the ADA data are presented in Table 2. A histogram of the

for voter preferences.

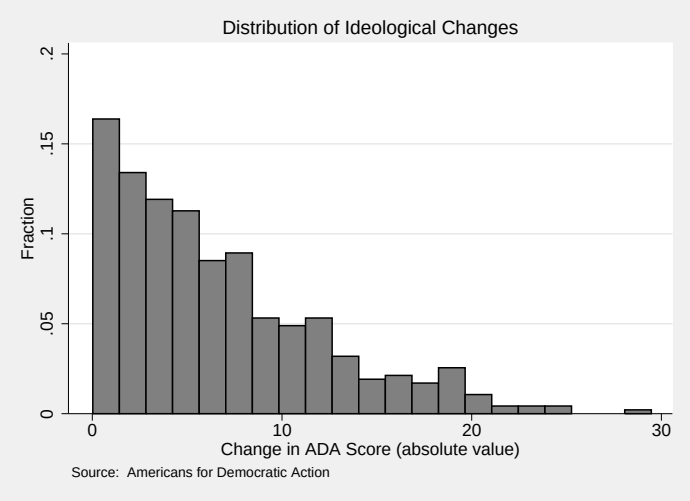

Figure 2: Distribution of Changes in Position by Senators

distribution of ideological changes are presented in Figure 2. Figure 2 presents the absolute value of changes ($|P - P_{-1}|$) and shows a distribution with a mass toward zero. Since upward and downward movements (i.e. becoming more liberal or conservative) are assumed to have identical costs, this figure is important for thinking about whether those costs are convex or non-convex. Convex costs would suggest most movements would be small and there would be a positive correlation between the movements. Indeed, the mass towards zero supports this. Over 11% of the changes are less than one point on the ADA scale and over 20% are less than 2 points on the scale. Non-convex costs would suggest a long right tail (i.e. many Senators making big jumps), which is not evident from Figure 2. Of all changes in position, the moves larger than 20 points on the ADA scale account for about 6.7% of the total change in position. These "jumps" constitute 1.9% of the observations.

If costs were zero, then one would expect a high correlation between changes in voter ideology and changes in Senator ideology and also a high correlation between the observed ideology of Senators and voters. The correlation of changes in Table 2 is low, at 0.06 and the correlation of observed ideologies is 0.544. A model with zero costs of adjusting position would result in both of these correlations being 1.00.

3 Reduced Form Evidence

The distance between the position of the Senators and the voters as measured by the ADA scores certainly has an effect on electoral outcomes. The unconditional correlation between a Senators' share of the two-party vote and his distance from the voters is -0.25 and is plotted in Figure 3. This relationship is strong and negative, as one might expect.

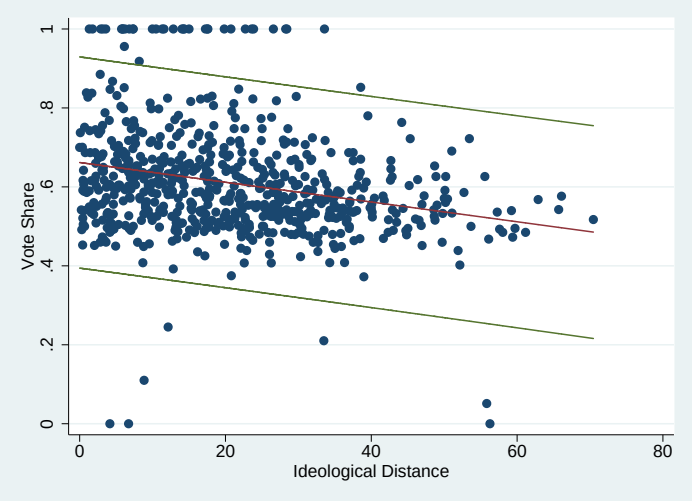

Figure 3: Correlation of Ideological Distance and Vote Share

Changing position also negatively effects ones electoral prospects. The unconditional correlation between the candidates share of the two party vote and the absolute value of his change in position is -0.08 (Figure 4). While not as strong as the relationship between distance and vote share, changes in position suggest a worse electoral outcome.

One might worry the unconditional correlation between vote share and the size of a candidates change in position is biased downward because those who change in position are likely to be those whose ideological position is far from the voters' preferred point. To correct for this, I regress the candidates share of the two party vote on ideological distance, changes in ideology, and changes in state economic conditions, candidate seniority, and national and state trends in party popularity. Tufte (1975) and Erikson (1990) find support for the role of economic conditions in the outcomes of Congressional elections and prompt me to control for changes in state income. Alesina and Rosenthal (1989) find controlling for national sways in opinion are important, therefore I include fixed effects for the interaction

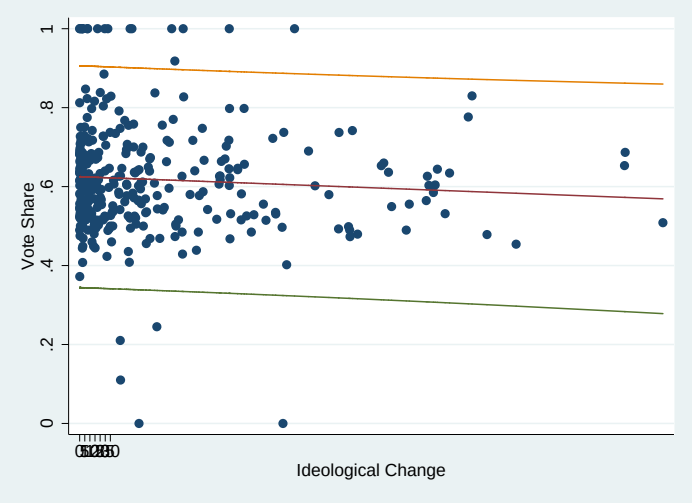

Figure 4: Correlation of Ideological Change and Vote Share

of the candidate's party and the year of the election. I also include fixed effects for party-state interactions, as a Democrat who is elected in a Republican state may face stronger opposition in elections than a Republican, even if the measured ideology is the same.

Table 3: Effects of Changes in Ideology on Incumbent Vote Share

Dependent Variable:	Candidate's Share of Two Party Vote					
Variable	1	2	3	4	5	6
Ideological Distance	-0.004***	-0.005***	-0.004***	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Abs(Change in Ideology)	-0.172		-0.374	-0.118		-0.266
	(0.128)		(0.406)	(0.145)		(0.438)
Square of Change in Ideology		-0.007	0.011		-0.005	0.008
		(0.006)	(0.020)		(0.008)	(0.024)
Seniority	1.149	1.164	1.132	-0.958	-0.965	-0.967
	(0.709)	(0.714)	(0.708)	(0.797)	(0.799)	(0.799)
% Change in State Income	11.898	11.795	11.89	2.568	2.542	2.646
	(8.624)	(8.641)	(8.649)	(8.723)	(8.714)	(8.762)
Year*Party Effects	Yes	Yes	Yes	Yes	Yes	Yes
State*Party Effects	No	No	No	Yes	Yes	Yes
Obs	325	325	325	325	325	325
R^2	0.972	0.971	0.972	0.986	0.986	0.986

Table 3 reports the results of these regressions. Ideological distance is defined as the square of the distance between the voters and the Senator, $(\theta - P)^2$. Changes in ideology are measured in two ways. First, by the absolute value of the change, $|P_i - P_{i,-1}|$. Second, by the square of the change in position, $(P_i - P_{i,-1})^2$. The coefficients on distance from

the voters and changes in positions have the expected (negative) sign in all specifications. Changes in state income are positively related to a candidates electoral prospects, which is anticipated, as all candidates included in the regressions are incumbents. In fact, they are all incumbents with at least two terms of tenure, which is needed to calculate changes in position. The effect of seniority is not consistent across models, but after the "sophomore surge", the literature finds small returns to being an incumbent.

While the change in ideology isn't statistically significant, I find changes in position negatively affect ones vote share in any model. A 10 point change in ideology results in a decrease of between 1.1 and 3.7 percent of the vote share, which is non-trivial. In fact, in model (1), a change in position of 6.63 ADA points (the average size of a change in position) is equivalent to a candidate being 9 ADA points further away from the voters. A difference of 9 points is more than the average distance between the positions of John McCain and Strom Thurmond.

There is a potential for a downward bias on the coefficients on ideological distance and changes in position. This bias comes from two sources. First, if running in an election is costly, those who run are likely to be those who anticipate winning. This means, those who are closer in position to the voters and who do not have to make large changes will run for office, while those who are far from the voters and would have to make large changes do not run. Second, even among those who run, those who change position are going to be those who are more likely to lose the election. That is, the decision to change position is in part determined by the likelihood of winning, which not only affects the decision of running, but is related to vote share if one does run. In order to account for these possible sources of bias, I estimate Heckman selection models where I instrument for the decision to run with the candidates seniority and models in which I instrument for changes in position with the change in position of the voters. Both models give larger point estimates of the coefficients on changes in position, but the standard errors are very large.

Another way to control for selection and the endogeneity of changes in position is to estimate a model of candidate positioning in a more direct fashion. This has the further advantage of controlling for the position of challengers. By not controlling for the position of challengers, I am biasing the estimates of the effects of changing position. For example,

imagine a case where the challenger takes a position very near the median voter and has a record that is close to the median as well. In such a case, the incumbent will likely have to move close to the median also, but he will face a low probability of winning since the challenger is also close to the median voter. So a large change comes with a low probability of victory, biasing up the estimates of the electoral costs to changing position. In the next section, I discuss the theoretical model of candidate positioning when changing position is costly.

4 A Dynamic Model of Candidate Positioning

4.1 Model of Voters

Let a voter's preferred position and identity be θ. Candidates and voters have common knowledge of θ, a point in a one dimensional policy space. Call this space "ideology".

Voters are myopic, voting for the candidate in the current election who maximizes their expected utility, a function of the policy the candidate puts into place one in office. Further, assume the demographics of the district change over time. That is, the distribution of θ will evolve. Thus $median\theta_t$ may not equal $median\theta_{t+1}$. Note, while the distribution of θ changes, this does not mean each of the voters' preferred points change only that there are changes in the composition of individuals that make up the Senators' constituencies.

Assume the voter's utility is quadratic so the expected utility of θ voting for candidate i is:

$$Eu(i,\theta) = E(-(P_i^{'} - \theta)^2) - C(P_i, P_{i,-1}) + \xi_i \tag{4.1}$$

Where ξ_i is a random component to the voters' utility, which is distributed i.i.d. and is unobserved by the candidates at the time of their platform choices. This can represent some surge of popularity during the election that is orthogonal to the popularity of the platform and is often called "valence" in the political science literature.

The function $C(P_i, P_{i,-1})$ is the "cost of adjustment". In a sense it is a punishment by the voters for a candidates change in position. One may parameterize this function in

several ways, according the story of electoral competition on thinks correct. I discuss the specification of this function shortly.

The state variables for the voters' problem are the voters' preferred points, θ, the current positions of the candidates, P_i, the past positions of the candidates, $P_{i,-1}$, and the transitory shock to the candidates' electoral chances, ξ_i.

4.2 Candidates

The model period unfolds in the following order. First, the incumbent chooses his policies and platform in office, P_i. Together, the incumbents record from previous periods, $P_{i,-1}$ and the current policy choice influences the voters' expectations about the incumbents position, $E(P_i^{'})$, and the cost of adjustment associated with the position, $C(P_i, P_{i,-1})$. After $E(P_i^{'})$ and $C(P_i, P_{i,-1})$ are determined, the challenger selects his current platform given his record and the position of the incumbent. Last the election is held and the winner realized.

Politicians care only about the rents from office and not their policy positions per se. Therefore, they chose a position to maximize the utility of the median voter and thereby maximize the probability of getting elected.

Given the assumption of $\xi_i \sim$ i.i.d. Type 1 Extreme Value and additive separability, we can write the politicians expected probability of victory as:

$$Pr(i\ wins|P_i, P_{i,-1}, P_{i,-1}, P_{j,-1}, med\theta) = \frac{exp(Eu_i(P_i, P_{i,-1}, med\theta)}{\sum_{i=1}^{2} exp(Eu_i(P_i, P_{i,-1}, med\theta))} \tag{4.2}$$

Therefore, candidate i chooses the P_i to maximize:

$$W_i(P_{i,-1}, P_j, P_{j,-1}, med\theta) = R + \beta Pr(P_i, P_j, P_{i,-1}, P_{j,-1}, med\theta) E_{med\theta, P_j^{'}} W_i(P_i, P_j^{'}, P_j, med\theta') \tag{4.3}$$

Candidates choose a position to maximize the probability of getting elected. This is highest if they get as close to possible (again, bearing in mind the costs of adjustment) to the median voter in each period. Without a stochastic term in the instantaneous utility function of the voter, this is 0/1, with the winner completely determined by the past positions of

the candidates.

4.3 Equilibrium

An equilibrium is found when: 1) Voters chose the candidates who maximizes utility, given the relevant states variables, including current positions of candidates 2) Incumbents choose positions to maximize utility, given the preferences of voters and the positions of challengers. [5]

4.4 Ideological Costs of Adjustment

4.4.1 Zero Costs of Adjustment

If changing position has no effect on a candidate's electoral prospects, then we are in the stylized Downsian world. In this case, $C(P, P_{-1}) = 0$ and candidates will always align themselves with the current position of the median voter, regardless of their past position.

4.4.2 Convex Costs of Adjustment

Bernhardt and Ingberman (1985), Ingberman (1989), and Enelow and Munger (1993) derive equilibria of electoral competition when voters are uncertain about the policies of candidates. The voters may be unsure the candidate will deliver on their campaign promises for a number of reasons. Writing the expected utility of voting for candidate i:

$$Eu(i, \theta) = E(-(P_i^{'} - \theta)^2) + \xi_i \tag{4.4}$$

One can pass through the expectations operator, perform some algebraic manipulation and find:

$$Eu(i, \theta) = -(E(P_i^{'}) - \theta)^2) - \sigma_{P_i}^2 + \xi_i \tag{4.5}$$

Here, costs to changing position are represented by uncertainty by the voters about the

[5] Voters expectations about future positions of candidates do not have to be consistent with the choices made by candidates in the model, as I am not enforcing rational expectations on the part of the voters. This is consistent with the assumption of voters who are not aware of the game the candidates are playing.

future positions of candidates. Given risk averse voters, as uncertainty about the future policies of the candidates increases, expected utility decreases. As shown by Enelow and Munger (1993), voters may use the past record of candidates to update their expectations about the candidate. In Enelow and Munger (1993), a change in position by the the politician increases the uncertainty of the voters and does so in a quadratic manner. Uncertainly increases at a rate proportional to the squared difference between the politicians past and current positions. This result is captured in the following specification of adjustment costs:

$$\sigma_P^2 = C(P, P_{-1}) = \frac{\gamma}{2}(P - P_{-1})^2 \tag{4.6}$$

Facing the convex adjustment costs of Equation 4.7, Senators will not be very responsive to changes in the preferences of their constituents. While candidates will want to align themselves with the voters, the costs of changing position increase quickly as one makes larger moves. Such costs force Senators to change position only in small increments. Senators will be "wishy-washy", making slight moves in any direction as the voters' preferred points in the ideological space change, but rarely making large jumps in their ideological position.

In addition, I also estimate a model where the costs of adjustment are linear. Such costs are consistent with the models of Bernhardt and Ingberman (1985) and Ingberman (1989), who allow the uncertainty of voters to be any function that is increasing the size of the deviations of candidates from their past record. These costs take the following form:

$$\sigma_P^2 = C(P, P_{-1}) = \kappa(|P - P_{-1}|) \tag{4.7}$$

4.4.3 Non-convex Costs of Adjustment

Still other models of candidate positioning assume the costs of adjusting one's position is the signaling of one's character. That is, voters derive utility from both the ideological stance of the politician and from the "character" of the politician. Kartik and McAfee (2007) and Callander and Wilkie (2007) models with just such a mechanism. In a dynamic version of these models, there may be a non-linear relationship between the size of one's change in

position and the penalty on pays for the change. If one either has character or does not (as in Kartik and McAfee (2007)), holding one's ground signals good character, any change in position signals one has no character. In a separating equilibrium, no character types will reveal themselves by changing position. Since character is valuable, these candidates will face a lower probability of election than candidates who have the same platform, but have character. This is modeled by a non-convex cost of adjustment where there is a fixed cost to adjusting position. The adjustment cost function is thus:

$$C^{NC}(P, P_{-1}) = 0 \tag{4.8}$$

Where C^{NC} is the cost function when one does not change position ($P = P_{-1}$). And:

$$C^{C}(P, P_{-1}) = -F \tag{4.9}$$

Where C^{C} is the cost function when one changes position and F is the fixed cost to changing position. Call the associated probabilities of re-election $Pr^{NC}(P_{i,-1}, P_j, P_{j,-1}, med\theta)$ and $Pr^{C}(P_i, P_{i,-1}, P_j, P_{j,-1}, med\theta)$, respectively. On can thus write the dynamic programming problem of the Senator as:

$$W(P_{i,-1}, P_j, P_{j,-1}, med\theta) = max[W^{NC}(P_{i,-1}, P_j, P_{j,-1}, med\theta), W^{C}(P_{i,-1}, P_j, P_{j,-1}, med\theta)] \tag{4.10}$$

Where

$$W^{NC}(P_{i,-1}, P_j, P_{j,-1}, med\theta) = R + \beta Pr^{NC}(P_{i,-1}, P_j, P_{j,-1}, med\theta) E_{med\theta, P_j'} W(P_i, P_j', P_j, med\theta') \tag{4.11}$$

and

$$W^{C}(\theta, P_{-1}, \xi) = R + \beta Pr^{C}(P_i, P_{i,-1}, P_j, P_{j,-1}, med\theta) E_{med\theta, P_j'} W(P_i, P_j', P_j, med\theta') \tag{4.12}$$

Candidates facing fixed costs to changing position will changes positions only when they are further away from the voters than a certain threshold, as determined by F. Senators facing fixed costs to adjustment often hold positions for a long period of time, but make larger changes than those in the convex models when they do change.

5 Structural Estimation

5.1 Empirical Model

One must make assumptions about the expectations of voters. I assume voters have the following expectations. First, $E(P_i^{'}) = \lambda P_i + (1-\lambda) Emed\theta^{'}$. [6] Voters take into account the evolution of the distribution of preferences when forming expectations over next periods policy choice. As in Bernhardt and Ingberman (1985), Ingberman (1989), and Enelow and Munger (1993), one might assume the function $C(\cdot,\cdot)$ is increasing in the distance between a candidates current policy choice and his record. That is, voters perceive candidates who have larger changes in position as having more uncertainty in their policy choices next term. Candidates whose current platforms are consistent with their records create less uncertainty in the minds of voters. Or one might follow the stories of Kartik and McAfee (2007) and Callander and Wilkie (2007) where politicians have character. Such a model leads to costs of adjustment that are independent of the size of one's change in position.

In order to estimate the dynamic model described above, one needs data on the past records of both candidates, the current positions taken by both candidates, and the preferred position of the median voter. While I use ADA scores to proxy for the current and past positions of those who have served in the Senate, I don't observe the past positions of first term Senators and I observe neither the past nor the current position taken by those who have never served in the Senate.

Because of this limitation, I am going to make the following assumptions about the past

[6] The policy put in place next period may differ from voter's expectations because of the realization of $\theta^{'}$. In addition, voters have uncertainty because they do not know the game the politicians are playing. Voters are not assumed to have rational expectations. This is consistent with the work of Bernhardt and Ingberman (1985), Ingberman (1989), and Enelow and Munger (1993). I follow their arguments against requiring rational expectations on the part of voters. The general argument is that RE places to much discipline on the behavior of voters whose contribution to the election outcome is so small. Retrospective voting strategies are supported by Fiorina (1981) and even by Downs (1957).

positions of challengers and about the uncertainty voters have about the future positions of these challengers. The model of challengers is rather reduced form, but consistent with both an incumbency advantage (as in Bernhardt and Ingberman (1985)) and with the model of candidate positioning described above.

I assume a challenger's current position, P_C, and the costs associated with this position, C_C, are drawn from a stationary bivariate normal distribution with mean μ and covariance Σ_C. These assumptions imply the expected utility of electing a challenger is:

$$Eu(C, \theta) = -(E(P_C^{'}) - \theta)^2 - C_C + \xi_C \tag{5.1}$$

Where the function $E(P_C^{'})$ is a function of the current position of the challenger, P_C, which is modeled as a random draw. The lack of data on the past positions of those who have not served in the Senate necessitated the modeling of P_C as a random process. In addition, because I do not want to assume challengers and incumbents face the same costs to changing position, the costs of adjustment, C_C, associated with the challenger and his position is also a random draw. That is to say, I model the challengers' best response function as a random process. I could have made an assumption about the challengers' cost of adjustment function and only have had to draw the past position of the challenger, but one is not able to identify both the parameters of this cost function for the challengers and the distribution of their past positions. Therefore I model the best response function (a current position and adjustment cost) of the challengers by a stochastic process. Allowing for a correlation between ones current position and the uncertainty of future positions is natural as one might expect there to be more uncertainty if a candidate adopts a more centrist position because he may be playing to the voters (see Enelow and Hinich (1981), Kartik and McAfee (2007))

This all implies the probability the incumbent wins can be written as:

$$Pr(i\ wins|P_I, P_{I,-1}, P_C, \sigma_C^2, med\theta) = \frac{exp(Eu_I(P_I, P_{I,-1}, med\theta)}{exp(Eu_I(P_I, P_{I,-1}, med\theta)) + exp(Eu_C(P_C, \sigma_C^2, med\theta))} \tag{5.2}$$

The assumptions on the utility and expectations of voters, on the stochastic valence of candidates, on the motivation of candidates, and the exogenous process describing challengers put structure on the model. The parameters of this structure is estimated using data on the positions taken by Senators on the liberal-conservative spectrum defined by the ADA. The candidates' rate of time preference β is set to an annual rate of 0.96. The expected value of a candidate's policy next period is determined by expectations about he evolution of the median voter and the parameter λ. This parameter is pinned down by the equilibrium condition requiring voters to have expectations about the future policy that are correct on average. The following parameters need to be estimated: μ, Σ_C, and the parameters describing the costs of adjustment function $C(P_i, P_{i,-1})$. I assume the mean of the distribution of challenger ideology is the same as the mean from the distribution of the median voters' preferred points. For the following analysis, I also assume the covariance between the ideology of challengers and the adjustment costs of challengers is zero. These assumptions leave me four parameters to estimate for each model : the mean costs of adjustment associated with challengers, $\bar{C}_C$, the standard deviation of challenger positions, σ_{P_C}, the standard deviation of challenger adjustment costs, σ_{C_C}, and γ, κ, or F, if the model if the convex adjustment cost model or the non-convex adjustment cost model.

Additionally, one needs to know the median preferred point of the voters. This is proxied for by the mean ADA score of House members from the state. It's evolution is assumed to follow a stationary AR(1) process, the parameters of which is estimated outside of the structural model (since it is exogenous to the choice of position by Senators).

5.2 Estimation Procedure

The parameters underlying the model of candidate positioning, $\Theta = (\mu, \Sigma_C, \gamma, \kappa, F)$, are estimated using a simulated method of moments (SMM) procedure as described in McFadden (1989). The use of SMM over alternative methods of estimation such as maximum likelihood, was done for several reasons. First, SMM is transparent. The moments I choose to match are well measured, clearly defined, and easily interpreted. Second, ML is more computationally burdensome to estimate since one must calculate the conditional probabilities of changes in position at all the grid points in the state space.

The procedure has the following algorithm. For a given vector of parameters, Θ, the dynamic programming problem (DPP) of the Senator is solved for. The solution to the DPP is a set of policy functions determining the Senator's optimal choice of ideological position given his past position, the past position of the challenger, the adjustment cost associated with the challenger's position, and the current position of the voters and the electoral shock ξ. These policy functions are used to simulate a panel of Senators and voters. A set of moments is calculated from the simulated panel. Call the vector of simulated moments $\Psi^s(\Theta)$.

The estimate $\hat{\Theta}$ is the vector of parameters that minimizes the weighted distance between $\Psi^s(\Theta)$ and the vector of moments from the data, Ψ^d. Formally, $\hat{\Theta}$ solves:

$$\pounds(\Theta) = min_{\Theta}[\Psi^d - \Psi^s(\Theta)]'W[\Psi^d - \Psi^s(\Theta)] \tag{5.3}$$

Where W is the optimal weighting matrix, calculated as the inverse of the variance covariance matrix of the data moments, as described in Smith (1993). This weighting matrix is the inverse of the variance-covariance matrix of the moments, calculated by bootstrapping the data. Using the SMM procedure with the optimal weighting matrix ensures consistent and efficient estimates of Θ.

In the minimization routine, the vector Θ is updated using a simulated annealing algorithm (Goffe and Rogers (1994)). Such an algorithm is very effective at finding the global minimum in cases where the objective function is non-linear in its parameters, as in this case.

5.3 Estimating the Preferences of Voters and Non-electoral Exit Probabilities

In addition to the parameter vector Θ, the decisions of the Senators depend upon retirement probabilities and the expectations of the future positions of voters.

Retirement probabilities are assumed to be constant. On average, just under 10% of Senators retire each term. The probability of retirement, δ, is found to be 0.097. [7]

[7] This is the simplest case. In general, the retirement probability may depend upon age and the distance between the Senator's position and the position of the voters. The distance between voters and Senators may

Understanding the persistence and variability in the preferences of the voters is an important component to the solution of the Senators' dynamic programming problem. The bliss point of the decisive voter is unaffected by the positions of the Senators and is assumed to follow and AR(1) process:

$$med\theta_{i,t} = (1-\rho)\mu_i + \rho med\theta_{i,t-1} + \epsilon_{i,t} \tag{5.4}$$

It is assumed $\epsilon \sim N(0, \sigma_\epsilon)$. The preferences of the decisive voter are proxied for by the mean score of House Representatives from the Senator's state as done in Levitt (1996). The AR(1) process is estimated using a least squares approach where the mean of the auto-regressive process is allowed to vary across states. Both ρ and σ_ϵ are restricted to be constant across states and are found to be 0.44 and 11.50, respectively. The AR(1) process is then approximated by a first-order Markov process following the method of Tauchen (1986) to determine the transitions of the voters in the discretized state space of the computational model.

5.4 Moments and Identification

To estimate Θ, I choose to match the following moments: the fraction of jumps [8], the serial correlation of changes in position, the re-election rate of incumbents, the correlation between re-election rates and the distance between a senator and voter's position, the correlation between the ideology of Senators and voters, the correlation between the ideology of Senators and voters for first term Senators, and the standard deviation of positions for first term Senators. While each of moment is affects by every parameter to some extent, I discuss next which moments contribute most to the identification of each parameter.

The fraction of jumps and the serial correlation in changes of position are most informative about the size and nature of the costs of adjustment. In the quadratic adjustment costs model, a larger value of γ implies fewer jumps. The fixed-cost model has more jumps s than the quadratic model, and the number of jumps increases as F decreases (for certain

affect the retirement probabilities because elections are costly and therefore one's decision run may depend upon their chances of winning. The chance of winning depends upon, among other things, the ideological distance between the voters and the Senator.

[8] A jump is defined to be a change in a Senator's position of at least 20 points on the ADA scale.

Table 4: Moments Used For Estimation

Moment	
Fraction of Jumps ($\geq$ 20 point change)	0.019
Serial Corr of Changes	-0.113
Incumbent Re-election Rate	0.832
Correlation(win,distance)	-0.111
Correlation of voter and Senator ideology	0.544
Correlation of voter and 1st term Senator ideology	0.500
Freshman Re-election Rate	0.807

ranges of F).

The serial correlation is also informative about the nature of the costs of adjustment. With quadratic costs of adjustment, one will find a relatively high degree of serial correlation. This is because Senators will not make large changes in position all at once because the costs to changing position are increasing with the size of the change. With linear costs of adjustment, the marginal cost of a change in position does not depend upon the size of the change, so the changes will be larger and the serial correlation lower. When costs are independent of the size of one change, as in the fixed cost case, the serial correlation will be lowest. Under fixed costs of adjustment, candidates will only change position when they are beyond a certain threshold from the voters. When Senators facing fixed costs change position, they will move very close to the voters at one time, resulting in a serial correlation that will be lower than in the two models of convex adjustment costs.

Re-election rates are determined by a number of the parameters, but they help to pin down the distribution of standard deviation of challenger uncertainty, $\bar{\sigma}_C$. Higher levels of challenger uncertainty lead to a larger incumbency advantage and thus higher incumbency re-election rates.

The correlation of Senator and voter ideology is significantly affected the size of the costs of adjustment and the the standard deviation in the level of challenger uncertainty, σ_{σ_C}. To separate the standard deviation in the uncertainty associated with challengers from the size of the costs of adjustment for incumbents, I include as a moment the correlation of Senator and voter ideology for first term Senators only.

Finally, the standard deviation of challenger positions, σ_{P_C} is identified by matching re-election rate of freshman Senators. This rate is is determined by the positions these

Senators campaigned on and the electoral cost to changing this position.

6 Results of Structural Estimation

The structural model is estimated estimated using ADA data from 1947-1999. Table 5 presents the results of estimation, reporting the parameters of the cost function, the values of the moments and the minimum statistic. All models are estimated fixing λ at 0.5 and the covariance of challenger position and challenger adjustment costs at 0. In addition to the baseline cases of zero, quadratic, linear, and fixed costs to adjustment, I also estimate a combination model. This model combines the quadratic costs of adjustment with fixed costs to adjustment. Such a model allows for both the role of uncertainty (as in Enelow and Munger (1993)) and character (as in Kartik and McAfee (2007)).

Using the minimum statistic as the criteria, the model with linear adjustment costs does the best at capturing the relevant moments. It is able to come very close to all four moments, and, in particular, does a much better job than the fixed cost model on matching the small number of large moves found in the data. The model with no costs of adjustment is clearly rejected by the data, with Senators being much too responsive to changes in voter ideology.

Table 5: Results of Structural Estimation

Model	No Cost	Linear	Quadratic	Fixed Cost	Fixed and Quad	Data
Parameters						
γ	0.000	0.000	2.040	0.000	0.983	-
	-	-	(1.700)	-	(0.119)	-
k	0.000	12.358	0.000	0.000	0.000	-
	-	(0.045)	-	-	-	-
F	0.000	0.000	0.000	360.453	73.896	-
	-	-		(97.392)	(34.716)	-
Moments						
Frac Jumps	0.173	0.015	0.000	0.048	0.003	0.019
Serial Correlation	0.340	0.217	0.333	0.054	0.237	-0.113
Re-elect Rate	0.832	0.836	0.830	0.820	0.846	0.832
Corr Ideo	1.000	0.560	0.551	0.366	0.548	0.544
Corr Win/Dist	-	-0.033	-0.015	-0.006	-0.024	-0.111
Corr Ideo, Freshman	1.000	0.497	0.413	0.358	0.451	0.500
Re-elect Rate, Freshman	0.806	0.832	0.826	0.817	0.841	0.807
$\pounds(\Theta)$	1054.983	22.232	58.238	78.292	33.593	-

As in the reduced for estimation, one finds large effects of changing position in the

structural models. Any model with a some costs of adjustment does much better at matching the relevant moments than does the model with no costs of adjustment. In the linear cost of adjustment model, a change of 6.63 ADA points (an average size change) lessens a candidates chances of victory by the same probability as being about 9 points further away from the voter along the ideological spectrum. This is very close to the quantitative significance found in the reduced form models.

Of the models with positive costs to adjustment, the worst fitting model is the model which posits fixed costs to adjusting position. In this model, any change in position, regardless of the size, established uncertainty in the minds of the voters and negatively affects a candidates electoral prospects. Such a model results in a serial correlation of changes that is closest to that found in the data, although no model can replicate the negative serial correlation found in the data without being much farther away from the other moments. Because of the large cost for any size change in position (any change incurs a cost equivalent to being about 18 points further way from the voters- more than the average distance between Senators Joseph Lieberman and Ted Kennedy), the correlation between the ideologies of Senators and voters is much lower than in the data.

Still, any model with a positive cost to adjusting one's position fits the data much better than the zero cost model. Senators move towards the voters, but, because of costs of adjustment, do not align themselves perfectly with the voters. Models where costs to changing position increase with the size of the change are the most consistent with the data.

7 Conclusion

The objective of this paper was to provide an understanding of the nature of "flip-flopping" among United States Senators. Using a large panel on the ideological positions of Senators and various empirical approaches, I have been able to come to several important conclusions regarding the costs Senators face when changing position.

First, I was able to document electoral costs to changing position. These costs are economically significant, with changes in position being penalized as much as differences between the ideology of the voters and Senator. Furthermore, I was able to clearly show

that models which include adjustment costs fit the data much better than the Downsian zero cost model. A model with a linear cost to adjusting position was found to fit the data best. That is, Senators face costs to deviating from their past records directly proportional to the size of their change in position.

Overall, the results provide more evidence against the stylized version of Downs' model and the validity of the median voter theorem as a description of a representative democracy. Flip flopping is indeed punished; Senators find moving towards the preferences of voters is best done in small moves. While multiple models of electoral competition are likely to be consistent with such a cost function, it is nonetheless important to understand such costs and their implications for electoral equilibrium such as non-convergence of candidate platforms.

Costs of adjusting position imply that the Median Voter Theorem (where the winning policy is that of the median voter) does not hold. Both my finding of costs of adjusting ones position and the empirical observation of the divergence of ideology between voters and Senators attest to the empirical failure of the median voter model. Understanding which model of adjustment costs fits the data best, will help in the development of a more realistic model of political competition.

A drawback of the model of electoral competition presented is that it does not fully specify the dynamic models that result in the costs to adjusting position. Specifying such a model is left a worthwhile goal. To my knowledge, no one has written down a model where changes in ideological position are costly as the polls and the voters have rational expectations. Many have proposed models where such costs are incorporated in a reduced form way (see, for example Banks (1990)), but there is not a model addressing "flip-flopping" per se.

Confirming this model on other interest group ratings, such as those of the American Conservative Union, would help to ensure the results. Additionally, combinations of the models, such as a model with both a fixed and quadratic cost to adjusting may fit the data better. These will be addressed in future research.

References

Alesina, Alberto, "Credibility and Policy Convergence in a Two-Party System with Rational Voters," *The American Economic Review*, September 1988, *78* (4), 796–805.

___ and Howard Rosenthal, "Partisan Cycles in Congressional Elections and the Macroeconomy," *American Political Science Review*, June 1989, *83*, 373–398.

Ansolabehere, Stephen, Jr. James M. Snyder, and III Charles Stewart, "Candidate Positioning in U.S. House Elections," *American Journal of Political Science*, January 2001, *45* (1), 136–159.

Banks, Jeffrey S., "A Model of Electoral Competition With Incomplete Information," *Journal of Economic Theory*, April 1990, *50* (2), 309–325.

Bernhardt, M. Daniel and Daniel E. Ingberman, "Candidate Reputations and the 'Incumbency Effect'," *Journal of Public Economics*, June 1985, *27* (1), 47–67.

Bronars, Stephen G. and Jr. John R. Lott, "Do Campaign Donations Alter How a Politician Votes? Or, Do Donors Support Candidates Who Value the Same Things That They Do?," *Journal of Law and Economics*, October 1997, *40* (2), 317–350.

Callander, Steven, "Political Motivations," *Review of Economic Studies*, forthcoming 2008.

___ and Simon Wilkie, "Lies, Damned Lies, and Political Campaigns," *Games and Economic Behavior*, August 2007, *60* (2), 262–286.

Cooper, Russell W. and John C. Haltiwanger, "On the Nature of Capital Adjustment Costs," *Review of Economic Studies*, 2006, *73*, 611–633.

Downs, Anthony, *An Economic Theory of Democracy*, New york: Harper, 1957.

Enelow, James M. and Melvin J. Hinich, "A New Approach to Voter Uncertainty in the Downsian Spatial Model," *American Journal of Political Science*, August 1981, *25* (3), 483–493.

___ and Michael C. Munger, "The Elements of Candidate Reputation: The Effect of Record and Credibility on Optimal Spatial Location," *Public Choice*, 1993, *99*, 757–772.

Erikson, Robert S., "Economic Conditions and the Congressional Vote: A Review of the Macrolevel Evidence," *American Journal of Political Science*, May 1990, *34*, 373–399.

Fiorina, Morris P., *Retrospective Voting in American National Elections*, Lexington, Massachusetts: Heath, 1981.

Glazer, Amihai and Marc Robbins, "Congressional Responsiveness to Constituency Change," *American Journal of Political Science*, May 1993, *29*, 259–273.

Groseclose, Timothy and James M. Snyder Steven D. Levitt, "Comparing Interest Group Scores across Time and Chambers: Adjusted ADA Scores for the U S Congress," *American Political Science Review*, 1999, *93* (1), 33–50.

Ingberman, Daniel E., "Reputational Dynamics in Spatial Competition," *Mathematical and Computer Modelling*, 1989, *12* (4-5), 479–496.

Kartik, Navin and R. Preston McAfee, "Signaling Character in an Electoral Competition," *American Journal of Political Science*, June 2007, *97* (3), 852–870.

L., Gary D. Ferrier Goffe William and John Rogers, "Global Optimization of Statistical Functions with Simulated Annealing," *Journal of Econometrics*, 1994, *60* (1-2), 65–99.

Levitt, Steven D., "How Do Senators Vote? Disentangling the Role of Voter Preferences, Party Affiliation, and Senator Ideology.," *American Economic Review*, June 1996, *86* (3), 425–441.

McFadden, Daniel, "A Method of Simulated Moments for Estimation of Discrete Response Models Without Numerical Integration," *Econometrica*, September 1989, *57* (5), 995–1026.

Poole, Keith and Howard Rosenthal, "Patterns of Congressional Voting," *American Journal of Political Science*, February 1991, *35*, 228–278.

___ and ___ , *Congress: A Political-Economic History of Roll Call Voting*, New York: Oxford University Press, 1997.

Poole, Keith T., "Changing Minds? Not in Congress!," *Working Paper, Dept. of Political Science, Univ. of Houston*, January 2003.

Smith, A.A., "Estimating Nonlinear Time-Series Models Using Simulated Vector Autoregressions," *Journal of Applied Econometrics*, December 1993, *8* (Supplement: Special Issue of Econometric Inference Using Simulation Techniques), S63–S84.

Stewart, Charles III and Jonathan Woon, "Congressional Membership Data, 80th to 109th Congresses, 1947-2006: Senate," July 2006.

Tauchen, George, "Finite State Markov-Chain Approximation to Univariate and Vector Autoregressions," *Economics Letters*, 1986, *20*, 177–181.

Tufte, Edward R., "Determinants of the Outcomes of Midterm Congressional Elections," *American Political Science Review*, September 1975, *69*, 812–826.